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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/917,796	07/31/2001	Jon C. Schaeffer	839-856	9520

7590 06/20/2002

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EXAMINER
MCNEIL, JENNIFER C

ART UNIT	PAPER NUMBER
1775	6

DATE MAILED: 06/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

2116

Office Action Summary	Application No.	Applicant(s)	
	09/917,796	SCHAEFFER ET AL.	
	Examiner	Art Unit	
	Jennifer McNeil	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 November 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 July 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Drawings

The drawings are objected to under 37 CFR 1.83(a) because they fail to show the vertical cracks in the ceramic coating as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3, 6, and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3 and 6 recites the limitation "said bond coating" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Regarding claim 3, the phrase "and/or" renders the claim indefinite.

In claim 6, line 3, should "chosen" be –selected--?

Claim 7 recites the limitation "the yttria-stabilized zirconia" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-7 are rejected under 35 U.S.C. 102(a) as being anticipated by Burns et al (US 6,042,898). Burns et al teach a thermal barrier coating including a superalloy substrate, a MCrAlY bond coat and a ceramic layer deposited by EBPVD. The columnar ceramic layer should include enough stabilizer to prevent an undesirable zirconium oxide phase change (i.e. a change from a preferred tetragonal or cubic crystal structure to the less desired monoclinic crystal structure) over the range of operating temperatures likely to be experienced in a particular gas turbine engine. Preferably, the columnar ceramic layer comprises a mixture of zirconium oxide and about 3-25 wt% yttrium (col. 4, lines 38-60). Regarding the limitation of dense vertically cracked deposition, this is considered a process limitation and does not structurally limit the final article. Furthermore, as disclosed by applicant, the final product of a thermal barrier deposited by EBPVD is structurally similar to that deposited by DVC (see page 9, paragraph 0020 of the instant specification).

Claims 1-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Bruce et al (US 5,987,088. Bruce et al teach a thermal insulating ceramic layer for use in a thermal barrier coating system on a turbine engine component. The ceramic layer is formed of zirconia stabilized with about

2-5 wt % of yttria. The ceramic layer is preferably deposited by EBPVD. The substrate is a superalloy and a bond coat (MCrAlY) may be used to anchor the ceramic layer (col. 3, lines 20-36). Regarding the limitation of dense vertically cracked deposition, this is considered a process limitation and does not structurally limit the final article. Furthermore, as disclosed by applicant, the final product of a thermal barrier deposited by EBPVD is structurally similar to that deposited by DVC (see page 9, paragraph 0020 of the instant specification).

Claims 1-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Bruce (US 6,352,788). Bruce teaches a thermal barrier coating system for components of turbine engines. The coating system includes a superalloy substrate, a bond coat (MCrAlY) and a ceramic layer. The ceramic layer is formed of zirconia partially stabilized by about 1 to less than six weight percent yttria and further stabilized by about 1 to about 10 weight percent of hafnia. The ceramic layer may be deposited by EBPVD (col. 3, lines 55-61). The thickness of the ceramic layer is commensurate with that of the instant claims. Regarding the limitation of dense vertically cracked deposition, this is considered a process limitation and does not structurally limit the final article. Furthermore, as disclosed by applicant, the final product of a thermal barrier deposited by EBPVD is structurally similar to that deposited by DVC (see page 9, paragraph 0020 of the instant specification).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burns et al (US 6,042,898). Burns et al teach a thermal barrier coating including a superalloy substrate, a MCrAlY

bond coat and a ceramic layer deposited by EBPVD as discussed above. The columnar ceramic layer comprises a mixture of zirconium oxide and about 3-25 wt% yttrium (col. 4, lines 38-60). While Burns et al teach a range of 3-25% of yttria added to the zirconia, no specific examples are given within the range of 3-5%. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to include yttria in an amount that falls within the range taught to be effective by Burns et al.

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce et al (US 5,981,088) in view of Farmer (US 6,047,539). Bruce et al teach a thermal barrier coating including a superalloy substrate, a MCrAlY bond coat and a ceramic layer deposited by EBPVD as discussed above. The ceramic layer is formed of zirconia stabilized with about 2-5 wt % of yttria. Bruce et al also disclose that the thermal barrier coating may be used on components used in hostile thermal environments such as turbine, combustor, and augmentor sections of a gas turbine engine (col. 2, lines 13-19). Bruce et al do not specifically teach a dense vertically cracked deposition of the ceramic layer. Farmer et al teach a method of preventing hot corrosion in a combustor of a gas turbine engine by deposition of a dense vertically cracked thermal barrier coating. The coating is applied so as to produce a segmented yttria-stabilized-zirconia ceramic structure having macrocracks formed therein which are oriented substantially perpendicular to an interface of the combustor component and the segmented ceramic structure. Farmer teaches that this particular type of thermal barrier coating has a greater resistance to particle erosion and thermal strain than those previously employed in gas turbine engine combustors. As it is taught by Farmer that depositing a YSZ coating by DVC deposition increases the resistance to thermal strain, and it is recognized by Bruce et al that the YSZ coating is used in multiple areas of turbine engines (i.e. combustors), it would have been obvious to one of ordinary skill in the art at the time of the invention to apply the coating of Bruce et al by this method to obtain a coating having increased thermal strain resistance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer McNeil whose telephone number is 703-305-0553. The examiner can normally be reached on Monday through Friday, 9:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 703-308-3822. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

JCM
June 16, 2002

Jennifer McNeil
Examiner
Art Unit 1775

DEBORAH JONES
SUPERVISORY PATENT EXAMINER